AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An ~~i~~nertial sensor based on diamagnetic levitation,

said inertial sensor comprising:

at least one non-contact position sensor,

a two dimensional array of permanent magnets, and

a diamagnetic element facing the said array,

wherein said diamagnetic element constitutes an~~the~~ inertial mass, and

wherein the inertial sensor senses inertial forces.

2. (Currently Amended) An ~~i~~nertial sensor according to claim 1 wherein said array is a bi-dimensional arrangement of permanent magnets called "Halbach 2D" wherein:

some of its constituting magnets are pointing in a direction Z orthogonal to the XY plan defining said array,

the magnetic field lines are mostly concentrated on one side of the said array and with very few magnetic field lines on the other side of said array,

along each of the two directions X and Y defining said "Halbach 2D" array of permanent magnets, one can see linear Halbach arrangements of permanent magnets : the polarities of adjacent magnets (along one direction) differ by an increment of 90°,

in order to avoid breaking the symmetry of the flux lines there are some missing magnets in the said array, and those missing magnets are located along directions parallel to the X+Y direction of the said magnet and in between 2 magnets with the same vertical polarisation.

3. (Currently Amended) An i~~I~~nertial sensor according to claim 1 further comprising a feed-back loop incorporating:

at least one~~1~~ non-~~-~~contact position sensor to detect the movements of said inertial mass,

at least three~~3~~ electrostatic actuators for keeping in place or moving said inertial mass, and

computing means to derive the force exerted on a support and for moving or keeping in place said inertial mass accordingly;

wherein said electrostatic actuators have one common electrode which is physically sealed to said inertial mass, the other electrode of each said electrostatic actuator facing and partly surrounding, or being partly surrounded by, said common electrode.

4. (Currently Amended) An i~~I~~nertial sensor according to claim 3 comprising:

two pairs of electrodes,

a four~~4~~ segments optical sensor,

a LED or laser source,

wherein said inertial mass is a disc of diamagnetic material surrounded by an aluminium crown thus constituting said common electrode; and

wherein said pairs of electrodes are diametrically facing said aluminium crown, each said pair of electrodes being placed orthogonally to the other pair of electrodes;

~~and~~ wherein said four~~4~~ segments optical sensor and said LED or laser source are respectively facing an opposite face of the surface delimited by said inertial disc shaped mass; and

~~and~~ wherein said inertial mass has a hole in its centre from which the light of said LED or laser source is spotting on said 4 segments optical sensor.

5. (Currently Amended) An i~~I~~nertial sensor according to claim 3 comprising:

two pairs of electrodes,

two pairs of non-contact position sensors,

wherein said inertial mass is a disc of diamagnetic material surrounded by an aluminium crown thus constituting said common electrode; ~~and~~

wherein said pairs of electrodes are diametrically facing said aluminium crown, each said pair of electrode being placed orthogonally to the other pair of electrode; and

wherein said pairs of non-contact position sensors are diametrically facing said aluminium crown , each said pair of electrode being placed orthogonaly to the other pair of electrode.

6. (Currently Amended) A bi-directional non-contact accelerometer or a bi-directional non-contact seismometer comprising an inertial sensor according to claim 1, wherein the sensor comprises a means for detecting motion of the diamagnetic element in two directions in response to bi-directional acceleration.

7. (Currently Amended) A non-contact bi-directional inclinometer or tiltmeter comprising an inertial sensor according to claim 1, wherein the sensor comprises a means for detecting motion of the diamagnetic element so as to detect inclination or tilt.

8. (Currently Amended) A non-contact gravimeter comprising an inertial sensor according to claim 1, wherein the sensor comprises a means for detecting motion of the diamagnetic element so as to detect gravity.

9. (Currently Amended) An ~~i~~nertial sensor according to claim 3 wherein said inertial mass has a cylindrical shape; ~~and~~

wherein said electrostatic electrodes are positioned regularly spaced on the surface of a cylinder facing said common electrode of said electrostatic actuator; and

wherein said common electrode of said electrostatic actuators is covered by a layer of pre-charged electret and the other electrode of each of said electrostatic actuator is made of at least three independent electrostatic alternating combs so as to create a rotating electric field that can spin said inertial mass.

10. (Currently Amended) A non-contact gyroscope comprising an inertial sensor according to claim 9, wherein the sensor comprises a means for detecting motion of the diamagnetic element so as to detect orientation.

11 - 17. (Cancelled).